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Virtual Art: From Illusion to Immersion. By Oliver Grau. Translated by Gloria Custance. The MIT Press, Cambridge, MA. (2003). 416 pages. \$45.

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Authors and contributors. Acknowledgments. Preface. Foreword. 1. Introduction. I. Silicon and transistors. 2. Semiconductor device physics (Jörg Kramer). 2.1. Crystal structure. 2.2. Energy band diagrams. 2.3. Carrier concentrations at thermal equilibrium. 2.4. Impurity doping. 2.5. Current densities. 2.6. p - n junction diode. 2.7. The metal-insulator-semiconductor structure. 3. MOSFET characteristics (Shih-Chii Liu and Bradley A. Minch). 3.1. MOSFET structure. 3.2. Current-voltage characteristics of an nFET. 3.3. Current-voltage characteristics of a pFET. 3.4. Small-signal model at low frequencies. 3.5. Second-order effects. 3.6. Noise and transistor matching. 3.7. Appendices. 4. Floating-gate MOSFETs (Chris Diorio). 4.1. Floating-gate MOSFETs. 4.2. Synapse transistors. 4.3. Silicon learning arrays. 4.4. Appendices. II. Statics. 5. Basic static circuits (Jörg Kramer). 5.1. Single-transistor circuits. 5.2. Two-transistor circuits. 5.3. Differential pair and transconductance amplifier. 5.4. Unity-gain follower. 6. Current-mode circuits (Giacomo Indiveri and Tobias Delbrück). 6.1. The current conveyor. 6.2. The current normalizer. 6.3. Winner-take-all circuits. 6.4. Resistive networks. 6.5. Current correlator and bump circuit. 7. Analysis and synthesis of static translinear circuits (Bradley A. Minch). 7.1. The ideal translinear element. 7.2. Translinear signal representations. 7.3. The translinear principle. 7.4. ABCs of translinear-loop-circuit synthesis. 7.5. The multiple-input translinear element. 7.6. Multiple-input translinear element networks. 7.7. Analysis of MITE networks. 7.8. ABCs of MITE-network synthesis. III. Dynamics. 8. Linear systems theory (Giacomo Indiveri). 8.1. Linear shift-invariant systems. 8.2. Convolution. 8.3. Impulses. 8.4. Impulse response of a system. 8.5. Resistor-capacitor circuits. 8.6. Higher order equations. 8.7. The heaviside-Laplace transform. 8.8. Linear system's transfer function. 8.9. The resistor-capacitor circuit (A second look). 8.10. Low-pass, high-pass, and band-pass filters. 9. Integrator-differentiator circuits (Giacomo Indiveri and Jörg Kramer). 9.1. The follower-integrator. 9.2. The current-mirror integrator. 9.3. The capacitor. 9.4. The follower-differentiator circuit. 9.5. The diff1 and diff2 circuits. 9.6. Hysteretic differentiators. 10. Photosensors (Jörg Kramer and Tobias Delbrück). 10.1. Photodiode. 10.2. Phototransistor. 10.3. Photogate. 10.4. Logarithmic photosensors. 10.5. Imaging arrays. 10.6. Limitations imposed by dark current on photosensing. IV. Special topics. 11. Noise in MOS transistors and resistors (Rahul Sarpeshkar, Tobias Delbrück, Carver Mead, and Shih-Chii Liu). 11.1. Noise definition. 11.2. Noise in subthreshold MOSFETs. 11.3. Shot noise versus thermal noise. 11.4. The equipartition theorem and noise calculations. 11.5. Noise examples. 12. Layout masks and design techniques (Eric Vittoz, Shih-Chii Liu, and Jörg Kramer). 12.1. Mask layout for CMOS fabrication. 12.2. Layout techniques for better performance. 12.3. Short list of matching techniques. 12.4. Parasitic effects. 12.5. Latchup. 12.6. Substrate coupling. 12.7. Device matching measurements. 13. A millennium silicon process technology (Albert Bergemont, Tobias Delbrück, and Shih-Chii Liu). 13.1. A typical $0.25\mu\text{m}$ CMOS process flow. 13.2. Scaling limits for conventional planar CMOS architectures. 13.3. Conclusions and guidelines for new generations. 14. Scaling of MOS technology to submicrometer feature sizes (Carver Mead). 14.1. Scaling approach. 14.2. Threshold scaling. 14.3. Device characteristics. 14.4. System properties. 14.5. Conclusions. Appendix A: Units and symbols. References. Index.

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